Before the
Federal Communications Commission
Washington, D.C. 20554

In the Matter of	)	
	)	
Biennial Regulatory Review – Amendment of	)	WT Docket No. 03-264
Parts 1, 22, 24, 27 and 90 to Streamline and	)	
Harmonize Various Rules Affecting Wireless	)	
Radio Services	)	

Comments of Powerwave Technologies, Inc.

Powerwave Technologies, Inc. ("Powerwave"), by its attorneys, hereby submits these comments to the Further Notice of Proposed Rulemaking in the above-captioned proceeding.[1] Powerwave is a leading international supplier of radio frequency power amplifiers. Powerwave designs, manufactures and markets single and multi-carrier ultra-linear power amplifiers for a variety of radio services and transmission protocols. The company's products are key components in wireless communications networks including the Cellular, Personal Communications Service ("PCS") and Advanced Wireless Service ("AWS"), in both urban and rural markets. Because the Commission is proposing basic changes in the way radiated power is currently measured for base station equipment, Powerwave and its customers have a stake in, and will be directly impacted by, the outcome of this proceeding.

Powerwave generally supports the CTIA proposal to use power spectral density ("PSD") as a basis for establishing radiated power limits for base station equipment. Powerwave believes that PSD limits are technologically neutral and preserve the flexibility of licensees to choose

[1] In the Matter of Biennial Regulatory Review – Amendment of Parts 1, 22, 27, and 90 to Streamline and Harmonize Various Rules Affecting Wireless Radio Services, WT Docket No. 03-264, *Report and Order and Further Notice of Proposed Rulemaking*, FCC 05-144 (Rel. August 9, 2005) (hereinafter the "2005 Order and Further NPRM")

among the various modulation schemes that are currently available or may be developed in the future for the delivery of wideband mobile services. For the reasons set forth in these comments, Powerwave urges the Commission to adopt PSD limits for cellular, PCS, AWS and other Part 27 base stations.

Background

Powerwave first raised the issue of outmoded base station power limits in 2002, when it explained in a waiver request that the peak output power limit in Section 24.232(a) discriminated against multi-channel power amplifiers ("MCPAs") by preventing their use above 100 Watts. On April 4, 2002, the Wireless Telecommuncations Bureau (the "Bureau") granted a waiver permitting Powerwave to obtain certification of a 125 Watt MCPA. The Bureau also recommended that Powerwave petition for rulemaking to amend Section 24.232(a) to permit the use of higher power amplifiers generally. Accordingly, pursuant to the request for comments in the 2002 Biennial Review Powerwave asked the Commission to eliminate the output power limit entirely and to clarify that the radiated power limit (1640 Watts EIRP) was meant to apply on a per carrier basis rather than a per base station basis.[2] Powerwave explained that it was the Commission's original intention to measure peak output power on a per carrier basis and, in fact, such intent was clarified by the Commission in a 1994 Reconsideration of the PCS rules, but this clarification, while explained in the text, had never been codified in the regulations.

[2] *See* In the Matter of 2002 Biennial Review of Telecommunications Regulations Within the Purview of the Wireless Telecommunications Bureau, *Comments of Powerwave Technologies, Inc.*, WT Docket No. 02-310 (October 18, 2002).

In the 2004 Notice of Proposed Rulemaking in this docket, the Commission recommended that Section 24.232(a) be amended per the suggestions by Powerwave.[3] Most commenters agreed with Powerwave that there was no longer any need to retain both output power and radiated power limits for PCS base stations, and the Commission eliminated the output power limits from Section 24.232(a).[4] Some commenters, however, also suggested that peak radiated power limit might be better expressed on a per megahertz, rather than a per carrier, basis. In particular, Motorola, Qualcomm and CTIA made specific proposals for adopting PSD limits for PCS base stations. This discussion prompted the Commission to issue the instant Further Notice of Proposed Rulemaking to ask whether PSD limits should be adopted and if so, whether such limits should also apply to cellular, AWS and the other services under Part 27.

Discussion

Powerwave believes that the CTIA proposal, as discussed further below, constitutes a balanced approach that is technologically neutral. It maintains the existing power levels needed for narrowband schemes yet provides licensees that are using (or migrating to) wideband schemes with sufficient power and flexibility to bring newly emerging video and high speed data services to market. Furthermore, Powerwave believes that there is little chance that a rule that specifies PSD limits for radiated power might create an unacceptable risk of harmful interference to other spectrum users. PSD limits, moreover, should apply to similar services that compete with each other – including cellular, PCS, AWS and other services regulated under Part 27. Powerwave sees little reason to adopt the Commission's suggestion that power be based on a "stepped" approach as it is inherently less flexible than a limitation based on PSD.

[3] *See* In the Matter of Biennial Regulatory Review – Amendment of Parts 1, 22, 24, 27 and 90 to Streamline and Harmonize Various Rules Affecting Wireless Radio Services, WT Docket No. 03-264, *Notice of Proposed Rulemaking* (January 7, 2004).
[4] *See* 2005 Order and FNPRM at ¶ 19.

1. The CTIA Proposal Should Be Adopted.

The Commission requested comment on the CTIA's proposal to limit average EIRP for broadband PCS stations having an antenna height of up to 300 meters above average terrain to the larger of : (1) 1640 Watts per carrier (3280 Watts in rural areas) and (2) 3280 Watts per MHz of emission bandwidth (6560 Watts per MHz of emission bandwidth in rural areas). The CTIA proposal would also permit narrowband emissions – bandwidths less than 500 kHz – to operate at 1640 Watts per carrier as they do at present, whereas stations with bandwidths of more than 500 kHz would be governed by PSD limits. Essentially, CTIA's proposal seeks to redress a perceived inequity that exists between the power levels permitted for narrowband versus wideband technologies.

Powerwave supported the CTIA proposal in earlier comments and continues to do so here.[5] As mobile licensees transition to services requiring greater carrier bandwidths, it makes little sense to adhere to limits that do not account for carrier size. Unless power levels are indexed to the expanding bandwidths required for new mobile offerings, licenseesthat are operating on fixed carrier power will be forced either to serve fewer subscribers or to reduce their areas of coverage. While it is theoretically possible to alleviate some of this concern by increasing the number of base stations or creating smaller cell sites, in reality this is not a viable alternative for most licensees. Even if the contentious zoning issues that seem to follow all new tower proposals were somehow to disappear, the cost of re-configuring the existing cellular infrastructure would be prohibitive for most licensees.

[5] *See* In the Matter of Biennial Regulatory Review – Amendment of Parts 1, 22, 27, and 90 to Streamline and Harmonize Various Rules Affecting Wireless Radio Services, WT Docket No. 03-264, *Ex Parte Statement of Powerwave* (December 29, 2004).,

2. Shifting to PSD Limits Does Not Pose a Threat of Harmful Interference.

The virtue of coupling radiated power to carrier bandwidth is the inherent flexibility of such an approach. The only concern is whether a "sliding scale" of power might pose an unacceptable risk of harmful interference from very wideband systems. While the Commission articulates this concern, it gives no reason for believing that the threat of harmful interference is tied to bandwidth. With PSD limits, power is spread evenly over all channels in any given segment of the licensed spectrum, regardless of spectrum size. If narrowband (primarily voice) systems, which can operate at 1640 Watts per carrier, do not cause interference in the spectrum they occupy, what reason is there to believe that a wideband system at a comparable PSD will cause interference? The Commission provides no answer to this question but simply alludes to the fact that wideband systems employ more aggregate power.

In any event, there are other rules currently in place that are designed to protect other spectrum users from mobile radio interference. PCS and AWS systems are prohibited from exceeding a specified field strength at the boundaries of their service areas[6] and cellular licensees are protected from both co-channel and adjacent channel interference within their serving areas under rules that require the cooperation of other licensees in resolving interference issues. Ultimately, regardless of the carrier bandwidth, the number of carriers involved or the number of subscribers being served, a licensee must abide by rules that already see to it that such interference will be avoided.

In this context, the Commission has also requested comment on whether the overall proposed power limits are needed (*i.e.*, whether licensees will actually use the power levels

[6] 47 C.F.R. § 24.236 specifies that "[t]he predicted or measured median field strength at any location on the border of the PCS service area shall not exceed 47 dBuV/m unless the parties agree to a higher field strength." *See also* 47 C.F.R. § 27.55.

being proposed). While Powerwave cannot speak to the future, it can state with assurance that the current per carrier power levels, which were set years ago when mobile video and high speed data were not yet on anyone's "drawing board," no longer serve the needs of licensees who are beginning to offer these new, spectrum-intensive services.[7] The Commission is urged to recognize that, while the future of mobile communications cannot be foretold, the only way to plan for it properly is to have in place a regulatory structure that can support the spectrum demands that continue to trend upward.

3. The Commission Should Not Choose an Alternative to the PSD "Sliding Scale."

For reasons not apparent, the Commission characterizes the CTIA proposal as resulting in a "potentially infinite number of linear scaled limit values."[8] The Commission overstates the case. Currently, there are a finite number of mobile radio modulation schemes, each with its own bandwidth and power requirements. The Commission's suggestion that the number of PSD calculations becomes infinite stems, in part, from the fact that EIRP measurements vary with antenna height and gain. But the suggested alternatives – a "stepped approach" or a list of power limits corresponding to some known emission bandwidths – may also become infinite as technologies evolve. Furthermore, at some level, the stepped approach becomes inherently arbitrary. By specifying power for a range of emission bandwidths, the Commission would perpetuate the inequity that now exists whereby those using a larger bandwidth must use the same power as those using less bandwidth. It becomes clear that the alternatives suggested by the Commission in Tables 1 and 2 of the 2005 Order and FNPRM,[9] are merely another way to

[7] Today, even some narrowband systems operate at the fully allotted 1640 Watts EIRP per carrier limit, particularly in the case of systems serving certain highways and using high gain directional antennas.
[8] 2005 Order and FNRPM at ¶ 62.
[9] *See Id.* at ¶¶ 62 & 63.

limit power. In Table 1, for instance, all systems with bandwidths in excess of 1 MHz would be permitted 3280 Watts EIRP per carrier. In Table 2, all systems using bandwidths above 3 MHz would be permitted 6560 Watts EIRP per carrier. The tables seem only an artifice constructed for capping power, but the Commission has provided no explanation for doing so. There is nothing similarly artificial about the CTIA scheme; those with greater bandwidth will have more power available, if needed, to provide the services that subscribers demand. PSD remains the fairest and most obvious way to determine power limits.

4. The Commission Should Harmonize Its Power Limit Regulations Across Similar Competitive Services.

The Commission has requested comment on whether it should apply the same radiated power limits adopted for PCS to similar services, such as cellular, AWS, and other Part 27 services. Powerwave is on record as supporting complete harmonization between the PCS and AWS regulations and urges the Commission not to distinguish between like services.[10] In the past, the Commission has recognized the wisdom of such harmonization and it should do so again here.

In its Order adopting service rules for AWS in the 1.7 GHZ and 2.1 GHz bands, the Commission stated "[w]e shall adopt the same 1640 Watts peak equivalent isotropically radiated power (EIRP) limit for AWS base stations in the 2110-2155 MHz band that is currently provided for base stations operating in broadband PCS under Part 24 of our rules."[11] The power issue is basic -- AWS spectrum is going to be used by PCS and cellular licensees to provide the

[10] *See* In the Matter of Service Rules for Advanced Wireless Services in the 1.7 GHz and 2.1 GHz Bands, *Petition for Reconsideration of Powerwave Technologies, Inc.*, WT Docket No. 02-353, (March 8, 2004). *See also* Service Rules for Advanced Wireless Service in the 1915-1920 MHz, 1995-2000 MHz, 2020-2025 MHz and 2175-2180 MHz Bands, *Comments of Powerwave Technologies, Inc.*, WT Docket No. 04-356 (December 8, 2004).
[11] Service Rules for Advanced Wireless Services in the 1.7 GHZ and 2.1 GHz bands, WT Docket No. 02-353, *Report and Order*, FCC 03-252, ¶ 96 (October 16, 2003).

advanced services that are now evolving and these will be overlaid on the present cellular and PCS infrastructure. Thus, it would be unreasonable to make a national commitment to advanced wireless services and then not provide these services with the flexibility and power levels needed to succeed.

Conclusion

For the reasons provided, the Commission should adopt the CTIA proposal for PSD limits on radiated power for carrier bandwidths above 500 kHz, regardless of carrier size. For carriers below the 500kHz the current limits should be applied on a per carrier basis. CTIA's proposal appears to be the fairest way to deal flexibly with a dynamic industry without the necessity for further rulemakings to assure that new services can evolve with sufficient power to serve consumers.

Respectfully submitted:

/s/

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